UNIVERSITY OF Miami

(2)

Ref:100-789:BRR:sf

July 23, 1992

Scientific Officer
Department of the Navy
Office of Naval Research
800 N. Quincy Street
Arlington, VA 22217-5000

Dear Sirs:

We are enclosing our final report (3 copies) of work performed under Agreement No. 00014-89-J-3172 reference "Partial Support of MAST Academy Outreach Program". We are forwarding two copies to DTIC, one copy to the Director of NRL, and one copy to the Administrative Officer of ONR in Atlanta.

Sincerely,

Bruce R. Rosendahl
Dean & Weeks Chair

Enclosures

Rosenstiel School of Marine and Atmospheric Science
Office of the Dean
4600 Rickenbacker Causeway
Miami, Florida 33149-1098
(305) 361-4000

Easylink Mailbox No. 62845425

Telex No. 317454

ABSTRACT

This document constitutes the final report of efforts taken under grant number N00014-89-J-3172. Under this program, students from the MAST Academy, and other Dade County Public High Schools, were placed in laboratory positions at three oceanographic institutions on Virginia Key, Miami, Florida during the summer of 1991. These students received direct supervision from faculty members at the Rosenstiel School of Marine and Atmospheric Science (RSMAS) and from staff scientists at the Atlantic Oceanographic & Meteorological Laboratories (AOML) and at the Southeast Fisheries Center (SEFC). This program provided the students an opportunity to work in a scientific environment and to appraise career opportunities in oceanographic science.

This document constitutes the Final Report of efforts undertaken under:

Grant No. N00014-89-J-3172/P00002
R&T Project: 4231042—03

GRANT PURPOSE

The purpose of this grant was to provide funding to conduct a high-school intern program jointly with the Dade County Public Schools. This program was supported by both the National Oceanic and Atmospheric Administration and the Navy. The conduct of the workshop, the personnel and effort, and the use of funds for direct and indirect expenses was generally as set forth in the Grantee's proposal entitled, "Partial Support of MAST Academy Outreach Program" dated May 8, 1991. Eligibility for this program was limited to Dade County high school students who:

- were entering grades 11 or 12.
- minimum grade point overall averaged 2.5 or above (3.0 being the minimum requirement for more specifically scientific or laboratory research jobs).
- good attendance record.
- successfully completed one or more of the following courses: Biology, Marine Biology, Ecology, Chemistry, Physics, Computer Applications.
- considered to be a high achiever, hard worker, and possess a positive attitude. Be self-directly and able to work independently if necessary. Able to work well with others; punctual, and dependable.
- must be able to provide or arranged for daily transportation to Virginia Key.
- complete application and interview process.

EXECUTION OF THE PROGRAM

Faculty at RSMAS and scientists at the NOAA/AOML and SEFC labs, who had participated in the summer intern program in previous years, were sent a request for summer positions and asked to fill out a job description form. These forms are attached as Appendix A. These forms were then sent to the MAST Academy, where the student applicants' skills were matched with specific job descriptions (i.e. those with computer skills were matched with a lab job doing scientific data processing). Faculty and scientists at the three labs were then called and interviews with the student applicants arranged. The final list of students and supervising faculty is given in Appendix B. The program ran from July 1 through August 23, 1991.

Paid summer internship positions were available with three federally supported oceanographic centers. They are:

- University of Miami, Rosenstiel School of Marine and Atmospheric Science.
- National Oceanic and Atmospheric Administration, Atlantic Oceanographic and Meteorological Laboratories.
- National Marine Fisheries Service, Southeast Fisheries Center.

The terms of employment and opportunities in this program were:

- a maximum of fifteen internships were available through an application and interview process.
- employment period was from July 1 through August 23, 1991.
- one annual elective credit was earned.
- each student earned $4.25 per hour for a 7.5 hour day.
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The 1991 timetable for this program was:

April 22	Faculty position requests and job descriptions due in Dean's Office/RSMAS (UM administration of program done through this office). Job descriptions sent to MAST Academy program administrator.
May 6	Student applications due in MAST office.
May 7-10	Applications checked for completeness by MAST staff; mentors (faculty and scientists) called and interviews scheduled.
May 20-June 7	Applicant interviews at job sites based on criteria stated on applications.
June 10-14	Mentors notify MAST of applicant decisions.
June 17-21	Students are notified of placement.
July 1	Students report to Dean's Office/RSMAS for orientation and to complete University paperwork related to hiring.
July 1-August 23	Students report to the job site Monday through Friday (or as arranged with mentor) with the exception of national holidays (July 4).

The program administrator for the summer internship program at the MAST Academy has received only 8 responses (out of 15) to a questionnaire that all students are asked to fill out detailing various aspects of their summer research experience. The questionnaire is intended to assess the program impact on participating students in the following areas:

- subsequent career choice.
- mentor contact.
- job opportunities and employability.
- academic standing and choice of curriculum.
- environmental awareness.

The preliminary results of the questionnaire (based on the 50% response level) are shown as Appendix C.

As is shown in the preliminary results, a large proportion of the interns report a positive influence on their high school grades after the internship. Several of the interns from each summer program, throughout the nine years of this program, have decided that science is the career they want and make plans to attend either the University of Miami Undergraduate Marine Science or Environmental Sciences Program, or a similar program at another university or college.

Many of the interns are taking, or plan on taking advanced science courses including advanced placement biology, chemistry and physics. Those who do not plan on taking advanced science courses generally fall into three categories: those who find that science is "harder" than they expected and seem daunted by the amount of work involved in both studies and actual physical research; those who find it less interesting than expected (a very small proportion of the respondents); and those who do not have these types of courses available at the school they presently attend.

Several of the interns report continued contact with their mentors throughout the year. In fact, of the three interns who returned for the summer program of 1992, contact with their mentor continued throughout the school year. These students also chose to return to the same laboratory in their second summer internship. And in one case, the student worked throughout the school year in his mentor's laboratory for school credit rather than pay. This student cites the mentor's accessibility and open communication about the research being done as the primary reason why he continued. In all cases where the administrators of the program have had personal communication with these students, there is a sense of the excitement and interest in science that is being stimulated in these young science interns.

The program purports to provide opportunity to high school students for direct science research experience as a means of stimulating interest in the sciences. The program can be evaluated yearly as to its effectiveness, but it should also be evaluated as a continuing and expanding pre-collegial program. A perusal of the data gathered in the eight years of the program supports the yearly evaluation that this approach is effective in achieving it's program goals. A substantial proportion of the students not only benefit academically from their participation, but are exposed to a more realistic experience of what a science career entails, including the physical requirements of laboratory research. They are also exposed to the academic environment in a direct way that enable them to realistically plan for their own college experience.

In the past the program provided for opportunities for inner city youth; at the present time the focus is more on academic excellence and exposure to oceanographic science for high school students in Dade County. This program has been very effective in identifying local students with a predilection for science and enabling them to experience many of the possibilities that exist in the oceanographic community for various types of research. The high school science

experience, though it has improved considerably in the past several years, does not begin to teach the student specific laboratory skills nor expose the student to the various fields in marine science. This program, as an extension of the high school experience, has opened up many previous unknown academic and career possibilities to those students who have already proven they are capable of achieving academic excellence and fulfilling their career goals.

Another positive result of the program is a greater environmental awareness on the part of these students. The exposure to scientists in general, and oceanographic scientists in particular, exposes the students to modalities not usually experienced in high school, among them an awareness of the effect of technology and development on the environment. By working in a coral reef laboratory, or with phytoplankton or doing data processing of coastal properties, these students gain specific knowledge of the natural world and the negative effects of pollution or urban development. There has been a consistent response from the summer interns, on their follow-up questionnaires, of a heightened awareness of some of the environmental problems that exist. It is perhaps a less visible result of the program, but this increased awareness may lead to career or academic choices related to the field of ecology.

Lastly, this program has been a success in providing experience that improves these young adult's job eligibility. Follow-up contact with former summer interns has shown that not only do many of these students feel more qualified to pursue jobs within the oceanographic and/or science community, they actually have gained some of the needed skills to perform well at these jobs. Several of the former interns are currently employed at the University or at the NOAA lab and one would have to credit the program with providing these students with not only the skills and experiences needed, but with confidence in their ability to obtain a job, fulfill job requirements, understand new procedures, and have the needed interpersonal skills to work under supervision and relate well to co-workers. Though the focus of the program has changed in the past two years from being primarily an opportunity for inner-city youth, the program does continue to provide this opportunity - many of the interns do come from what is considered the "inner-city" in Dade County. It is another indication of the success of the program that career opportunity and job eligibility has been increased for these students.

APPENDIX A

JOB DESCRIPTIONS

FOR

MAST ACADEMY OUTREACH PROGRAM

SUMMER MARINE AND ENVIRONMENTAL SCIENCE INTERNSHIP PROGRAM

July 1 through August 23, 1991

MARINE AND ENVIRONMENTAL SCIENCE INTERNSHIP JOB DESCRIPTION FORM

DADE COUNTY PUBLIC SCHOOLS
1444 Biscayne Boulevard, Suite 303
Miami, Florida 33132
(305) 995-1922

Please check:
- (x) full agency payment
- ( ) partial agency payment
- ( ) ICMP full reimbursement

Position Title Research Assistant **Hours** 9 am - 5 pm

Agency University of Miami

Job site address East Grosvenor 110
4600 Rickenbacker Causeway, Miami

Immediate Supervisor DR. Larry Brand **Phone** 361-4138

Agency contact person _____ **Phone** _____
(If different from Immediate Supervisor)

Number of positions available 2

Minimum Age 15

Special Requirements none
(ie: skills, course prerequisites, etc.)

Dress Requirements none

JOB DESCRIPTION

The work involves conducting laboratory experiments on the growth of marine phytoplankton

MARINE AND ENVIRONMENTAL SCIENCE INTERNSHIP JOB DESCRIPTION FORM

DADE COUNTY PUBLIC SCHOOLS
1444 Biscayne Boulevard, Suite 303
Miami, Florida 33132
(305) 995-1922

Please check:
- (X) full agency payment
- ( ) partial agency payment
- ( ) ICMP full reimbursement

Position Title Juvenile fish culturist **Hours** M - F 8:00-4:00 p.m.

Agency Rosenstiel School of Marine and Atmospheric Science

Job site address Experimental Fish Hatchery

Immediate Supervisor Beth Linnon **Phone** 361-1236

Agency contact person DR. ELIZABETH CLARKE **Phone** _____
(If different from Immediate Supervisor)

Number of positions available 2

Minimum Age _____

Special Requirements good physical health
(ie: skills, course prerequisites, etc.)

Dress Requirements casual

JOB DESCRIPTION

Assisting permanent staff with daily care of juvenile and larval fish. Feeding, maintaining and observing the fish. Primarily indoor work. Some outdoor work with collection of wild plankton possible.

MARINE AND ENVIRONMENTAL SCIENCE INTERNSHIP JOB DESCRIPTION FORM

DADE COUNTY PUBLIC SCHOOLS
1444 Biscayne Boulevard, Suite 303
Miami, Florida 33132
(305) 995-1922

Please check:
- (X) full agency payment
- ( ) partial agency payment
- ( ) ICMP full reimbursement

Position Title Reef fish culturist **Hours** M-F 8:00-4:00 p.m.

Agency Rosenstiel School of Marine and Atmospheric Science

Job site address _____

_____

Immediate Supervisor Beth Linnon **Phone** 361-1236

Agency contact person DR. ELIZABETH CLARKE **Phone** _____
(If different from Immediate Supervisor)

Number of positions available 2

Minimum Age _____

Special Requirements good physical health
(ie: skills, course prerequisites, etc.)

Dress Requirements casual

JOB DESCRIPTION

Assisting permanent staff with daily care of reef fish stock. Feeding, maintaining and observing the fish. Primarily outside work. Some indoor work with laboratory cultures possible.

JOB NUMBER MG 1 (MARINE GEOLOGY)

AGENCY: University of Miami, Rosenstiel School of Marine and Atmospheric Sciences

POSITION TITLE: Marine Geological Technician

SUPERVISOR/MENTOR: Dr. Robert N. Ginsburg PHONE: 361 1840

JOB SITE ADDRESS: Fisher Island Station
Miami Beach

NUMBER OF POSITIONS AVAILABLE: 1 MINIMUM AGE: 16

HOURS: 9:00 a.m. - 4:30 p.m.

SPECIAL REQUIREMENTS: Interest in Geology: Experience in using hand tools preferred.

DRESS REQUIREMENTS: Discuss with employer

JOB DESCRIPTION:

•Intern will assist Geologists in preparing rock and sediment samples and as needed in field collection.

•Intern will work closely with the professional staff of the Marine Geology and Geophysics Division. He/she will gain familiarity with the principles, concepts, work processes, facilities and research programs of RSMAS.

•Intern will be given specific work instructions and guidance. His/her work will be closely reviewed during the program. He/she will develop new skills and working relationships as a member of the Marine Geology and Geophysics research team.

MARINE AND ENVIRONMENTAL SCIENCE INTERNSHIP JOB DESCRIPTION FORM

DADE COUNTY PUBLIC SCHOOLS
1444 Biscayne Boulevard, Suite 303
Miami, Florida 33132
(305) 995-1922

Please check:
- (X) full agency payment
- ( ) partial agency payment
- ( ) ICMP full reimbursement

Position Title Marine Geological Technicia Hours 9-4:30

Agency University of Miami RSMAS

Job site address Fisher Island Station

Miami Beach, FL 33139

Immediate Supervisor Dr. Robert N. Ginsburg Phone 672-1840

Agency contact person _____ Phone _____
(If different from Immediate Supervisor)

Number of positions available 1

Minimum Age 16

Special Requirements (ie: skills, course prerequisites, etc.) 1. Needs daily transportation to and from Fisher Isl. back on McArthur Causeway 2. Experience in using hand tools prefered.

Dress Requirements No Special Clothing.

JOB DESCRIPTION

Assist Geologists in preparing rock and sediment samples and where needed in Marine field collection.

Fax to Jean Lewe

MARINE AND ENVIRONMENTAL SCIENCE INTERNSHIP JOB DESCRIPTION FORM

DADE COUNTY PUBLIC SCHOOLS
1444 Biscayne Boulevard, Suite 303
Miami, Florida 33132
(305) 995-1922

Please check:
- (x) full agency payment
- ( ) partial agency payment
- ( ) ICMP full reimbursement

Position Title Computer operater/typist **Hours** 7.5/day

Agency ONR innercity program

Job site address RSMAS 4600 Rickenbacker

Immediate Supervisor C. Pike/ S. Gruber **Phone** 361 4146

Agency contact person S. Gruber **Phone** 274 0628
(If different from Immediate Supervisor)

Number of positions available 2

Minimum Age 16

Special Requirements Typing skills
(ie: skills, course prerequisites, etc.)

Dress Requirements ordinary

JOB DESCRIPTION

Administrative work in the office, library, including word processing, data analysis, etc. Clerical work.

March 26, 1990

MEMORANDUM

TO: Jean Lewe

FROM: Mike McGowan
Research Assistant Professor, MBF

SUBJECT: Summer Job Description for Inner City Marine Program

I have space for 1 person this summer to work on Project SEFCAR (Southeastern Florida and Caribbean Recruitment), a study of lobsters and reef fishes. The job is 75% laboratory work and 25% field work. In the laboratory the student will sort plankton under a microscope and enter data into a computer. There will be 2 field trips of 3 to 4 days to the Florida Keys where the student will help collect samples from a small boat. There is the possibility of going with us on an oceanographic vessel for up to 7 days during August.

Highschool and Undergraduate Research Opportunities: D. Olson 361-4074

Students: Raymond Aguero and Peter Strecher

Work Address and Phone: D. Olson's Data Lab, MSC 234B, 361-4628

Contact Person and Phone: Geoff Samuels, 361-4056

Job Description: Work will include data analysis and processing, including digital satellite image processing, time series analysis, and the processing of hydrographic data. Creative research opportunities in numerical modeling and mathematical methods are encouraged. Experience will be gained in computer programming (UNIX, VMS operating systems; C, FORTRAN languages) and computer graphics.

Summer Employment Positions

Position Title: Student Research Assistant

# of Positions: 1 - 2

Minimum Age: 16

Special requirements: Stong background or interest in biology, oceanography and related fields. Snorkeling or swimming ability.

Dress: Periodically, covered shoes.

Job Description: Assist fish research and curatorial activities at the Fish Research Museum, Rosensteil School of Marine & Atmospheric Sciences, Univ. of Miami. Involves introductory training and basic research in standard procedures of museum curation and laboratory and field fish biology. This includes techniques of standard museum operations; collection and preservation of fishes in the field; laboratory processing of samples; microscopic identification procedures; and associated icythyological skills. Utilization of the RSMAS and museum libraries will be encouraged.

Dr. C. Richard Robins 361-4196
(Ken Lindeman)

MARINE AND ENVIRONMENTAL SCIENCE INTERNSHIP JOB DESCRIPTION FORM

DADE COUNTY PUBLIC SCHOOLS
1444 Biscayne Boulevard, Suite 303
Miami, Florida 33132
(305) 995-1922

Please check:
- (X) full agency payment
- ( ) partial agency payment
- ( ) ICMP full reimbursement

Position Title LAB ASSISTANT Hours 8:30 AM – 5 PM

Agency RSMAS

Job site address 4600 RICKENBACKER CSWY

MIAMI FL 33149

Immediate Supervisor Dr. ALINA SZMANT Phone 361-4609

Agency contact person _____ Phone _____
(If different from Immediate Supervisor)

Number of positions available 2

Minimum Age 17

Special Requirements BIOLOGY, + ANY OTHER SCIENCES HELPFUL
(ie: skills, course prerequisites, etc.)

Dress Requirements INFORMAL - shorts + t-shirt

JOB DESCRIPTION

HELP FEED, CLEAN AND GROW CORALS IN THE LABORATORY. CONDUCT EXPERIMENTS WITH CORAL LARVAE. ASSIST IN MAKING MEASUREMENTS OF CORAL PHYSOLOGY.

APPENDIX B

LIST OF STUDENT INTERNS AND MENTORS

FOR

MAST ACADEMY OUTREACH PROGRAM

SUMMER MARINE AND ENVIRONMENTAL SCIENCE INTERNSHIP PROGRAM

July 1 through August 23, 1991

MAST ACADEMY OUTREACH
SUMMER INTERNSHIP PROGRAM
1991

HIGH SCHOOL STUDENT	MENTOR	INSTITUTION/DIV*
Adderley, Zandra C.	Drs. Clarke/Frazel	RSMAS/MBF
Aguero, Ramon A.	Drs. Yamamoto/Shon	RSMAS/AMP
Cavalaris, James G.	Drs. Clarke/Frazel	RSMAS/MBF
Cavalaris, Joy C.	Dr. Brand	RSMAS/MBF
Davis, Monica E.	Dr. Peter Swart	RSMAS/MGG
Gross, Shannon C.	Dr. Alina Szmant	RSMAS/MBF
Gunder, Shawanda L.	J. Pfoffenberger	SEFC
Levy, Wren H.	S. Kelly-Fraga	SEFC
Martinez, Elias	Drs. Clarke/Frazel	RSMAS/MBF
Rodriguez-Perez, Manuel	Dr. Szmant	RSMAS/MBF
Rolle, Leila A.	Librarian	NOAA/AOML
Simon, Eric J.	Drs. Clarke/Frazel	RSMAS/MBF
Squire, Piper L.	J. Pfoffenberger	SEFC
Vassor, Wasco P.	Drs. Clarke/Frazel	RSMAS/MBF
Wallace, Jr., Larry	W. Teas	SEFC
Yaghdjian, Rouben J.	Dr. Brand	RSMAS/MBF
Youatt, Jon A.	Drs. Clarke/Frazel	RSMAS/MBF

Legend:

RSMAS	Rosenstiel School of Marine & Atmospheric Science
NOAA/AOML	Nat'l Oceanic & Atmospheric Administration/Atlantic Oceanographic & Meteorological Laboratory
SEFC	Southeast Fisheries Center
MBF	Marine Biology & Fisheries (RSMAS Academic Division)
MGG	Marine Geology & Fisheries (RSMAS Academic Division)
AMP	Applied Marine Physics (RSMAS Academic Division)

APPENDIX C

MAST ACADEMY OUTREACH PROGRAM

ANNUAL CAREER FOLLOW-UP SURVEY

MARINE & ENVIRONMENTAL SCIENCE INTERNSHIPS

1991

PRELIMINARY REPORT

1991 - 92
MAST ACADEMY OUTREACH PROGRAM
ANNUAL CAREER FOLLOW-UP SURVEY REPORT
MARINE AND ENVIRONMENTAL INTERNSHIP

OVERVIEW

A total of 20 senior high school students, and 2 middle school students were placed in internship positions ranging from marine geological technician to animal care assistant. Of the 22 interns, 11 were placed with University of Miami scientists. The interns were from 9 different high schools and 2 middle schools, and consisted of 10 blacks, 5 Hispanics, 7 whites, 10 females and 12 males.

SUMMARY OF PRELIMINARY FINDINGS

Preliminary completion of survey data indicates that the internship program continues to be a rewarding experience for the participants. Perhaps the most significant finding was that 88% of the interns reported a positive influence on their attitudes towards science after completion of the program; 75% indicated a positive effect on their high school conduct, attendance, and attitudes towards school in general, while 63% reported a positive influence on their grades.

Seventy-five percent of the interns are taking, or plan on taking advanced science courses including Advanced Placement Chemistry, Biology, and Physics. Half of the students are planning a future career in science, all of these students indicating that their mentors had a significant influence on their decision.

All of the students indicated that the internship experience enhanced their understanding of employer/employee and co-worker relationships; 88% stated that the experience improved their sense of independence and self direction on the job, while 75% felt more proficient in science laboratory and technology skills as a result of their experience.

1991 - 92
MAST ACADEMY OUTREACH PROGRAM
ANNUAL CAREER FOLLOW-UP SURVEY REPORT
MARINE AND ENVIRONMENTAL INTERNSHIP

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All of the students indicated that the internship experience enhanced their understanding of employer/employee and co-worker relationships; 88% stated that the experience improved their sense of independence and self direction on the job, while 75% felt more proficient in science laboratory and technology skills as a result of their experience.

Sixty-three percent of the interns reported continued contact with their mentors. Two-thirds have been offered additional opportunities as a result of their internship. These opportunities ranged from perminant employment to assistance with science fair or research projects .

Two-thirds of the eligible interns requested that they be contacted to participate in the 1992 Summer program; all of these students have been placed in an internship position again this year, many with their same supervisor.

Detailed results of the student survey will be forwarded upon request.